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## NOTICE OF ALLOWANCE AND FEE(S) DUE

22116 7590 09/13/2010

SIEMENS CORPORATION  
INTELLECTUAL PROPERTY DEPARTMENT  
170 WOOD AVENUE SOUTH  
ISELIN, NJ 08830

EXAMINER

OSBORNE, LUKE R

ART UNIT

PAPER NUMBER

2123

DATE MAILED: 09/13/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/588,353

05/02/2007

Wolfgang Borchers

2003P15367WOUS

7146

TITLE OF INVENTION: COMPUTER-ASSISTED MODELLING METHOD FOR THE BEHAVIOR OF A STEEL VOLUME HAVING A VOLUMETRIC SURFACE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	12/13/2010

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

#### I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

22116 7590 09/13/2010

**SIEMENS CORPORATION**  
**INTELLECTUAL PROPERTY DEPARTMENT**  
**170 WOOD AVENUE SOUTH**  
**ISELIN, NJ 08830**

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/588,353 05/02/2007 Wolfgang Borchers 2003P15367WOUS 7146

TITLE OF INVENTION: COMPUTER-ASSISTED MODELLING METHOD FOR THE BEHAVIOR OF A STEEL VOLUME HAVING A VOLUMETRIC SURFACE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional NO \$1510 \$300 \$0 \$1810 12/13/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
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OSBORNE, LUKE R 2123 703-006000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_

3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee  
☐ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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22116 7590 09/13/2010

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EXAMINER

OSBORNE, LUKE R

ART UNIT

PAPER NUMBER

2123

DATE MAILED: 09/13/2010

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 635 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 635 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/588,353	BORCHERS ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	LUKE OSBORNE	2123	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 6/9/10.
2. ☒ The allowed claim(s) is/are 22-39.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date <u>5/25/10</u></li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application</li> <li>6. <input type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date _____.</li> <li>7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other _____.</li> </ol> |
|---|---|

## **DETAILED ACTION**

### ***Claim Status***

1. Claims 22-39 are pending in the instant application.  
Claims 22-39 stand allowed.

### ***Foreign Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submission on 5/25/10 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the Examiner. In the submission dated 5/25/10 in the foreign patent document section items 1 and 2 have not been considered. These documents have not been submitted to the office.

### ***Drawings***

4. The replacement drawings for figures 4, 5, 8 and 18 were received on 6/9/10.  
These drawings are acceptable.

### ***Abstract***

5. The Abstract submitted 6/9/10 is acceptable and has been entered.

***Claim Rejections - 35 USC § 112***

6. Examiner acknowledges the amendments to claims 22-39. Consequently the rejection is withdrawn.

**EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Tina Gonka on 9/3/10.

The application has been amended as follows:

The text of claims 22, 23, 26 - 28, 31, 32, 34, 35, 38 has been replaced with the following amendment.

--22. A method for computer-assisted modeling behavior of a steel volume having a volumetric surface, comprising:

resolving a thermal conduction equation and a phase change equation to determine a subsequent state of the steel volume;

operating a computer based on an instantaneous initial state of the steel volume and an instantaneous influence quantity via the volumetric surface on the steel volume, wherein at least one influence quantity includes a local influence for a plurality of surface elements of the volumetric surface and the local influence operates via the plurality of surface elements on the steel volume;

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identifying a local energy content of the steel volume where the initial state and the determined subsequent state for a plurality of volume elements of the steel volume comprise local proportions of modeled phases of the steel and a quantity, wherein

the modeled phases of the steel comprise austenite and a first further phase which can transform between austenite and the first further phase, and

the initial state and the determined subsequent state for at least one of the volume elements further comprise a local distribution in concentration of a mobile alloy element in the steel;

determining which concentrations of the mobile alloy element are present on both sides of a first phase boundary between austenite and the first further phase for the at least one of the volume elements based upon the phase change equation;

resolving a first Stefan problem;

determining, based on the resolution of the Stefan problem, if the distribution in concentration of the mobile alloy element changes in an austenitic zone of the at least one of the volume elements and if the first phase boundary is displaced; and

determining the local proportions of the phases based on the position of the first phase boundary defined by the extent of the displacement of the first phase boundary.

23. The method in accordance with claim 22, further comprising:

providing a second further phase which can transform between austenite and the second further phase;

determining which concentrations of the mobile alloy element are present on both sides of a second phase boundary between austenite and the second further phase for the at least one of the volume elements based upon the phase change equation; and

determining, based on a resolution of a second Stefan problem, whether and how a distribution in concentration of the mobile alloy element changes in the austenitic zone of the volume element and if the second phase boundary is displaced, wherein:

the first and second Stefan problems are coupled to each other,

square measures are assigned to the phase boundaries,

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a proportion of the square measure assigned to the second phase boundary is determined from the sum of the square measures, and

the local proportions also depend on the proportion of the square measure assigned to the second phase boundary in the sum of the square measures.

26. The method in accordance with claim 25, further comprising:

determining whether austenite is changed only into the first further phase, only into the second further phase or both into the first and into the second further phase based upon the proportion of the square measure assigned to the second phase boundary of the sum of the square measures.

27. The method in accordance with claim 26, wherein:

the volume element is a cuboid and has three cuboid basic dimensions,

the first phase boundary is a rectangle with a first longitudinal side and a first transverse side where the first longitudinal side corresponds to a first of the cuboid basic dimensions,

the first transverse side is parallel to a second of the cuboid basic dimensions, and

displacements of the first phase boundary are parallel to a third of the cuboid basic dimensions.

28. The method in accordance with claim 27, wherein:

the second phase boundary is a rectangle having a second longitudinal side and a second transverse side where the second longitudinal side corresponds to the first cuboid basic dimension,

the second transverse side extends parallel to the second cuboid basic dimension, and

displacements of the second phase boundary occur in parallel to the third cuboid basic dimension.



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31. The method in accordance with claim 30, wherein the concentrations where at least one mobile alloy element is present on both sides of the first phase boundary or on both sides of the first and second phase boundary are determined on the basis of Gibbs free enthalpies of the phases.

32. The method in accordance with claim 31, further comprising:  
determining  
whether both austenite and the first further phase are present, or  
whether, in addition to austenite and the first further phase, the second further phase is also present based on the phases present in the initial state and on the basis of the Gibbs free enthalpies of the phases.

34. The method in accordance with claim 33, wherein the thermal conductance equation is resolved for each volume element of the plurality of the volume elements.

35. The method in accordance with claim 22, further comprising:  
specifying a first state and a desired end quantity to the computer,  
applying the modeling method iteratively where the instantaneous initial state of a first iteration corresponds to the first state and subsequent initial states of further iterations correspond to the subsequent state previously determined,  
determining an expected end quantity based on the subsequent state determined after a last iteration, and  
comparing the expected end quantity with the desired end quantity.

38. A steel volume influencing system, comprising:  
a digital mass storage device for storing a computer program;  
a computer connected to the mass storage device for execution of the computer program where the program:

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resolves a thermal conduction equation and a phase change equation to determine a subsequent state of the steel volume based on an instantaneous initial state of the steel volume and an instantaneous influence quantity via a volumetric surface on the steel volume, wherein at least one influence quantity includes a local influence for a plurality of surface elements of the volumetric surface and the local influences operate via the plurality of surface elements of the steel volume,

identifies a local energy content of the steel volume where the initial state and the determined subsequent state for a plurality of volume elements of the steel volume comprise local proportions of modeled phases of the steel and a quantity, wherein

the modeled phases of the steel comprise austenite and a first further phase which can transform between austenite and the first further phase, and

the initial state and the determined subsequent state for at least one of the volume elements further comprise a local distribution in concentration of a mobile alloy element in the steel,

determines which concentrations of the mobile alloy element are present on both sides of a first phase boundary between austenite and the first further phase for the at least one of the volume elements based upon the phase change equation,

resolves a first Stefan problem,

determines, based on the resolution of the Stefan problem, if the distribution in concentration of the mobile alloy element changes in an austenitic zone of the at least one of the volume elements and if the first phase boundary is displaced,

determines the local proportions of the phases based on the position of the first phase boundary defined by the extent of the displacement of the first phase boundary, and

determines an influence quantity based on an initial quantity determined from the initial state and a desired subsequent quantity, and

generates an influencing signal according to the determined influence quantity; and

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an influencing device that receives the influencing signal from the computer and influences the temperature of the steel volume.--

***Examiners Reasons for Allowance***

The following is an examiner's statement of reasons for allowance:

While O.P. Bruno et al., Free Boundary Conditions at Austenite-Martensite Interfaces, 1/30/1995, The American Physical Society, Volume 74, Number 5, pages 746-749, and G. N. Vlasichev, A method of numerical solution of one-dimensional stefan problems of two types, 1993-09-01, Journal of Engineering Physics and Thermophysics, Volume 65, Issue 3, Pages 896-902, both of these references teach that there are fluid boundaries located in metal and some numerical solutions to the problem neither/none of these reference(s) taken either alone or in combination with the prior art of record disclose resolving a thermal conduction equation and a phase change equation and further resolving a Stefan problem to determine the phase boundaires, specifically including:

(claim 22) resolving a thermal conduction equation and a phase change equation to determine a subsequent state of the steel volume ... determining which concentrations of the mobile alloy element are present on both sides of a first phase boundary between austenite and the first further phase for the at least one of the volume elements based upon the phase change equation; resolving a first Stefan problem,

(claim 38) resolves a thermal conduction equation and a phase change equation to determine a subsequent state of the steel volume based on an instantaneous initial

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state of the steel volume and an instantaneous influence quantity via a volumetric surface on the steel volume ... determines which concentrations of the mobile alloy element are present on both sides of a first phase boundary between austenite and the first further phase for the at least one of the volume elements based upon the phase change equation, resolves a first Stefan problem

in combination with the remaining elements and features of the claimed invention. It is for these reason that the applicant's invention defines over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUKE OSBORNE whose telephone number is (571)272-4027. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul L. Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Luke Osborne/  
Examiner, Art Unit 2123

/Paul L Rodriguez/

Supervisory Patent Examiner, Art Unit 2123